

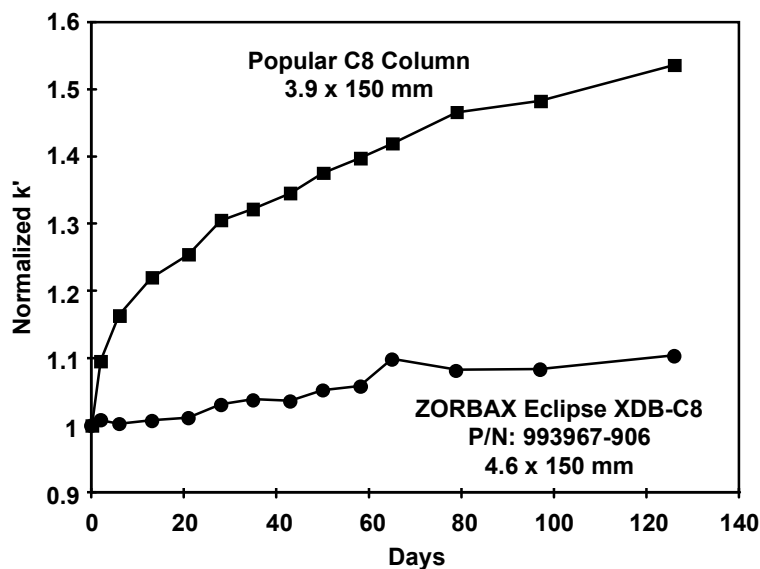
It's Not the Initial Chromatogram, It's the Column Lifetime

Application
Technical
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Column performance changes during use; this is one reason why column-to-column reproducibility is of concern to most chromatographers. The instant you place the column in the instrument and start mobile phase flowing through it, the column begins the "aging process." The best way to insure long life is to follow the manufacturer's operating instructions during use; but, there are times when columns must be used in mobile phases that will degrade the bonded phase and / or the silica. In these situations, you should search for a column that will undergo minimal change.

Highlights

- ZORBAX Eclipse XDB-C8 is highly stable to intermediate-pH mobile phases while competitive xerogel silica-type columns are not.
- When using pH 6 - 8 mobile phases choose ZORBAX Eclipse XDB-C8, if column life is important.



Conditions:
65:35, MeOH : H₂O
containing 7 mM potassium phosphate buffer at pH 7 and 23°C



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At mid pH, columns can rapidly change during use. This is not due to silane hydrolysis, but to dissolution of silica. Even at pH values of 7, this process occurs. These changes are generally believed to be the result of the creation of additional hydroxyl groups as the silica is dissolved. Compounds sensitive to the silanol population will exhibit retention time shifts and often peak shape changes.

In this example, a ZORBAX Eclipse XDB-C8 and a popular C8 column are compared. One column has a retention time change of over 25% in the first 25 days, with a total change of 55% over a 125 day exposure to a pH 7, using phosphate buffer mobile phase. The ZORBAX Eclipse XDB-C8 column changes only 10%. In this example there were two main differences between the columns. One difference was the type of silica. The more quickly degraded material was based on a xerogel-type silica and the ZORBAX Eclipse XDB-C8 is a solgel-type silica. The second difference was that the more quickly changing column was singly endcapped while the ZORBAX Eclipse XDB-C8 column was doubly endcapped.

Clearly, both columns "aged" during use, as exemplified by change in relative k' of the analyte; but, the ZORBAX change was acceptable. If one uses an analogy of steel rusting, steel is painted to keep the "corrosive agent" away from the steel. In HPLC, the endcapping may be thought of as a coating (the paint) and double endcapping appears to be more effective coating which protects the silica from the "corrosive" mobile phase. Further, the xerogel is a "soft" silica and dissolves faster than solgel silica (ZORBAX).

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